PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : B31F 1/07, B27N 5/00

A1

(11) International Publication Number: **WO 00/09319**

(43) International Publication Date: 24 February 2000 (24.02.00)

(21) International Application Number: PCT/US99/18479

(22) International Filing Date: 12 August 1999 (12.08.99)

(30) Priority Data:
09/132,733 12 August 1998 (12.08.98) US

(71) Applicant: IMPACT CREATIVE TECHNOLOGIES, INC. [US/US]; Suite 900, 535 16th Street, Denver, CO 80202 (US).

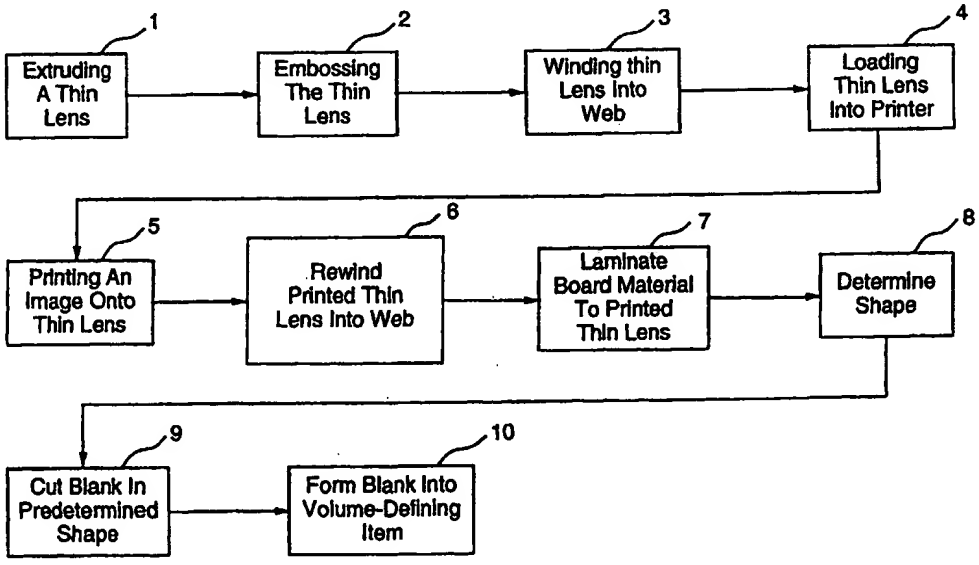
(72) Inventor: GUEST, Richard; 7838 East Long Place, Englewood, CO 80112 (US).

(74) Agent: LAZZARA, Michael, D.; Eckert Seamans Cherin & Mellott, LLC, 44th floor, 600 Grant Street, Pittsburgh, PA 15219 (US).

(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published
With international search report.

(54) Title: A METHOD FOR PRODUCING VOLUME-DEFINING ITEMS EMPLOYING LENTICULARLENS TECHNOLOGY



(57) Abstract

A method for producing volume-defining item (30) utilizing lenticular lens material including providing thin lens (41) having opposing surfaces: smooth, flat surface (43) and embossed lenticular surface (42). Image (44) is printed on surface (43) of lens (41) and then laminated to a board such as a board which is food safe. Then the laminated material is cut and formed into item (30) which can be a disposable cup.

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece			TR	Turkey
BG	Bulgaria	HU	Hungary	ML	Mali	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MN	Mongolia	UA	Ukraine
BR	Brazil	IL	Israel	MR	Mauritania	UG	Uganda
BY	Belarus	IS	Iceland	MW	Malawi	US	United States of America
CA	Canada	IT	Italy	MX	Mexico	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NE	Niger	VN	Viet Nam
CG	Congo	KE	Kenya	NL	Netherlands	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NO	Norway	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	NZ	New Zealand		
CM	Cameroon			PL	Poland		
CN	China	KR	Republic of Korea	PT	Portugal		
CU	Cuba	KZ	Kazakstan	RO	Romania		
CZ	Czech Republic	LC	Saint Lucia	RU	Russian Federation		
DE	Germany	LI	Liechtenstein	SD	Sudan		
DK	Denmark	LK	Sri Lanka	SE	Sweden		
EE	Estonia	LR	Liberia	SG	Singapore		

A METHOD FOR PRODUCING VOLUME-DEFINING ITEMS EMPLOYING LENTICULAR LENS TECHNOLOGY

BACKGROUND OF THE INVENTION

This invention relates to a method for producing volume-defining items having lenticular lens technology to provide images on the produced items.

In marketing and selling a product, it is often advantageous to impart an appealing, aesthetic appearance to the product to improve its desirability in the eyes of a consumer. Volume-defining items such as, for example, food containers provided for use in a typical fast-food setting, may possess images for advertising, movie promotions, games of chance, pictures, cartoons, or other similar images. Conventional packaging and providing of images on a volume-defining item are accomplished by printing an image on a sheet-like material and then wrapping and adhering the printed sheet-like material to conform to the shape of a volume-defining item. This method presents difficulty when producing items having a volume or irregular contours not readily suitable for receiving a two-dimensional printed sheet and also requires a two-step process.

In addition, typical packaging provides printing stationary, two-dimensional information and pictures on wrappers, boxes, containers, cups, and the like. Lenticular lens technology provides a means for producing an attractive, aesthetic display with enhanced marketing and advertising appeal. See, *e.g.*, U.S. Patent No. 5,695,346.

It has been known to make lenticular lenses by forming them through an extrusion process or by employing a colander for larger size lenses or injection molding. Such systems provide a lenticular lens on one surface of the plastic film and a flat surface on the other. It has also been known to apply interlaced preprinted images on paper backing or other material and with great precision to secure the same to the film

flat surface to thereby establish a unitary article having the image and the lenticular lens with the relative lens viewing positions providing the desired images.

The printing of items utilizing lenticular lens technology includes methods such as sheet fed offset (lithographic), web fed offset (lithographic), web fed rotary letterpress, web fed roto-gravure, and sheet fed screen printing. These types of printing require a multi-step method before items can be provided with an image and finished as a usable product. These state of the art methods may include providing a transparent web to an in-line printing process which has a flat side and a lenticular side; transporting and printing an image on the flat surface of the transparent web with a printing unit; applying an opaque coating to that flat surface; applying an opaque web material over the opaque coating; setting the image on the flat surface with a heat setting device; and then subsequently cutting and stacking the material for further production use. These methods are intended to create an illusion of depth for a viewer of the image seen on the flat surface of the transparent web initially provided. See, *e.g.*, U.S. Pat. 5,560,799.

It has generally been known to print an image on a basic, two-dimensional sheet and subsequently adhere and affix this sheet to the surface of a volume-defining item. Although the presently known methods often include extra, non-value-added steps in producing volume-defining items, such as disposable cups, containing lenticular lens technology. These methods also do not specify preferable thickness tolerances for application of additional materials to lenticular webs. Paper stock, for example, may be additionally combined with the lenticular web.

What is lacking in the art, therefore, is an improved method for producing particular items having lenticular lens material. The improved method is directed to accomplish these tasks with fewer non-value-added process steps than current processes which print images for application to items, such as disposable cups, for example, utilizing lenticular lens technology. The improved method also adheres to more defined tolerances which are preferable in the production of consumable or disposable volume-defining items.

SUMMARY OF THE INVENTION

The present invention has met or exceeded the above-mentioned needs, as well as others.

A method is provided for producing items utilizing lenticular lens technology. The method combines in a novel way a number of steps which are conventional and well known in the art to form volume-defining items using lenticular lens technology. The method starts by providing a thin lens having an embossed lenticular surface on a first side and a flat surface on an opposing side. Next, the method includes printing an image on the flat surface of the thin lens to provide a printed thin lens which is then laminated to a board material, such as paper stock used in disposable cups. Finally, the printed and laminated thin lens produced in the previous step is cut into a preselected shape or format and then formed into its ultimate embodiment as a volume-defining item utilizing lenticular lens technology.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a functional process flow diagram depicting the functional process steps involved in the method of the present invention;

Figure 2 depicts a blank cut into a predetermined shape by a step of the method of the present invention;

Figure 3 shows a volume-defining item produced by the method of the present invention; and,

Figure 4 is a cross-sectional view taken along line 4-4 of Figure 3.

DETAILED DESCRIPTION OF THE INVENTION

As used herein, the terms "web" or "in-web" refer to materials applied as rolls of material instead of in sheets of material. The term "volume-defining" is broadly defined as the quality of embodying at least a portion of a volume. Thus, the term "volume-defining items" may include, but is not limited to, items such as, for example, disposable drinking cups, closed and open-ended boxes, food containers, spheres, pyramids, or other shapes which are fundamentally characterized as enclosing at least a portion of a volume.

Referring now to the Figures, an embodiment of the method of the present invention is provided in Figure 1. The thin lens may be extruded by a conventional process 1 such as that of VPI of Shaboygan Falls, Wisconsin. The thin lens may be embossed 2, substantially simultaneously with step 1, thereby providing a lenticular

surface such as by the conventional process of VPI, such as with an engraved roller. Optionally, the embossing operation may be performed as a secondary, off-line operation subsequent to the extruding operation. The extruded thin lens is provided in web to permit application of web printing technologies. The initial thin lens should also possess an opposing flat surface suitable for receiving a printed image. At this stage in the method, the thin lens with its embossed lenticular surface has a thickness preferably of from about 0.008 to 0.009 inches. Next, this thin lens is wound into web 3, thereby forming a preloaded web of embossed plastic material prepared for printing. The winding process is provided by state-of-the-art means such as by a conventional roller unit.

Then, the preloaded web of embossed plastic material is loaded for lens print 4 and a printing press is used to print an image 5 or graphics onto the flat surface of the preloaded web of embossed plastic material, thereby producing a printed thin lens. The printed image may be any variety of image or images having an appealing appearance as embodied in an item possessing the image. By way of example, and in the context of a cup, a racing car may be printed onto the thin lens in various stages of change. This would provide an illusion of movement when the cup is turned by a consumer such that the racing car appears to move across the outside surface of the cup. Other examples might envision Santa Claus drinking a beverage or the image of a popular sports figure alternated with his or her sports statistics. Printing of the thin lens 5 is accomplished by utilizing a conventional web offset (lithographic) in one embodiment employing plates during the printing process.

In another embodiment, printing may also be accomplished by a conventional web rotogravure technology employing engraved cylinders. If one elects to print the image onto the thin lens using web offset technology, the printing step is performed on a wide web offset, with a preferable width of from about 32 to 40 inches, and is performed as a single operation. If one elects to print the image onto the thin lens using web roto-gravure technology, the printing step is performed on a wide web roto-gravure printing press that may possess in-line laminating functionality and possibly may have in-line die cutting capabilities. This in-line feature lends a more efficient and cost effective approach to performing the method of the present invention. The printing press

of this embodiment is preferably from about 32 to 40 inches wide. Once the image is printed, the printed thin lens is rewound into web format 6.

Next, the method provides for laminating the printed thin lens to a board material 7 which is preferably a paper stock such as a treated, food safe board material. Although the board material may be a multitude of other materials, such as the plastic used in a credit card, for example. The laminating step may be accomplished by any well known method for heat or adhesive conjoining of web to web, sheet to web, or sheet to sheet materials. The lamination may be performed as part of an in-line continuous manufacturing process or as part of an off-line sub-process of the main process flow. The board material is optionally provided in either web or sheet format. The thickness of this board material is preferably from about 0.007 inches to about 0.009 inches. Thus, the laminating of the printed thin lens to the board material may combine a web of the printed lens married to either a sheet or a web of the paper stock material.

Referring again to the method embodied in Figure 1, the printed and laminated lens formed in the previous step 7 preferably has a combined thickness, of printed and laminated thin lens and board material, from about 0.016 inches to about 0.02 inches. The web of a board material may be food safe, treated board material such as that provided by a combination of a board and a coating. The board may be provided as a conventional product of International Paper. The coating, which is provided to treat the board to make it food safe, may be applied by a method such as that used by RJR Packaging of Winston-Salem, North Carolina.

Referring again to Figure 1, a preselected shape is determined 8 and the printed and laminated thin lens is cut 9 according to this preselected shape. This cutting step is preferably effected by a conventional process such as by die cutting. The preselected shape will be user defined and depend primarily on the ultimate item desired to be formed by the one employing this method. If a disposable cup is the ultimate item to be formed, for example, then a shape 20 similar to that embodied in the shape of Figure 2 will be cut by the cutting step of this method. Other volume-defining items, such as lenticular disposable french fry containers, for example, are also contemplated by the scope of this invention.

The preselected shape which is cut as a result of the previous step 9 is next formed into a volume-defining item 10, such as a disposable cup, for example,

which includes the printed and laminated thin lens containing a particular and desirable image. The forming process may be performed by utilizing a conventional heat seal process to seal the edges of the preselected shape and to form the disposable cup or other product. A conventional forming process may be utilized such as that provided by Imperial Bondware of Shelbyville, Illinois.

In further examining another aspect of the invention in Figure 3, a disposable cup 30 formed by the methods of the present invention is provided. This disposable cup, in accordance with the method of the present invention, is embodied as a printed and laminated thin lens which has been cut and formed into a disposable cup having a lenticular image or images 31 formed thereon.

Additionally, Figure 4 provides a cross-sectional view of a portion of the disposable cup provided by the view at 4-4 of Figure 3. The thin lens 41 is embodied with a lenticular surface 42 and a flat surface 43. Printing of an image 44 is performed on the flat surface 43 in preparation to be viewed through the lenticular surface 42. Laminating a board material 45 to the flat surface 43 over the printed image 44 is performed to provide an additional layer to the cross-section prior to the cutting and forming processes.

While specific embodiments of the invention have been disclosed, it will be appreciated by those skilled in the art that various modifications and alterations to those details could be developed in light of the overall teachings of the disclosure. Accordingly, the particular arrangements disclosed are meant to be illustrative only and not limiting after the scope of the invention which is to be given the full breadth of the appended claims and any and all equivalents thereof.

WHAT IS CLAIMED IS:

1. A method for producing a volume-defining item having lenticular lens material comprising:

providing a thin lens having an embossed lenticular surface and a flat surface;

printing an image on said flat surface of said thin lens to provide a printed thin lens;

laminating said printed thin lens to a board material to provide a printed and laminated thin lens;

cutting said printed and laminated thin lens to form a blank having a preselected shape; and,

forming said blank into said volume-defining item determined by said preselected shape.

2. The method of claim 1, further comprising extruding a thin lens prior to said providing a thin lens.

3. The method of claim 1, wherein said thin lens having a thickness of from about 0.008 to 0.009 inches.

4. The method of claim 1, wherein said printed thin lens having a thickness from about 0.008 to 0.009 inches.

5. The method of claim 1, wherein said printing is performed on a web offset printing press.

6. The method of claim 5, including said wide web offset printing press having a width of at least about 36 inches.

7. The method of claim 1, wherein said printing is performed on a roto-gravure printing press.

8. The method of claim 7, including said roto-gravure printing press having a width of at least about 36 inches.

9. The method of claim 1, wherein said board material is a food safe, treated board material.

10. The method of claim 1, including said printed and laminated thin lens having a thickness from about 0.016 inches to 0.02 inches.

11. The method of claim 1, wherein said cutting comprises using a die for cutting.

12. The method of claim 1, wherein said volume-defining item is a disposable cup.

13. A volume-defining item formed in accordance with the method of claim 1.

14. A disposable cup formed in accordance with the method of claim 12.

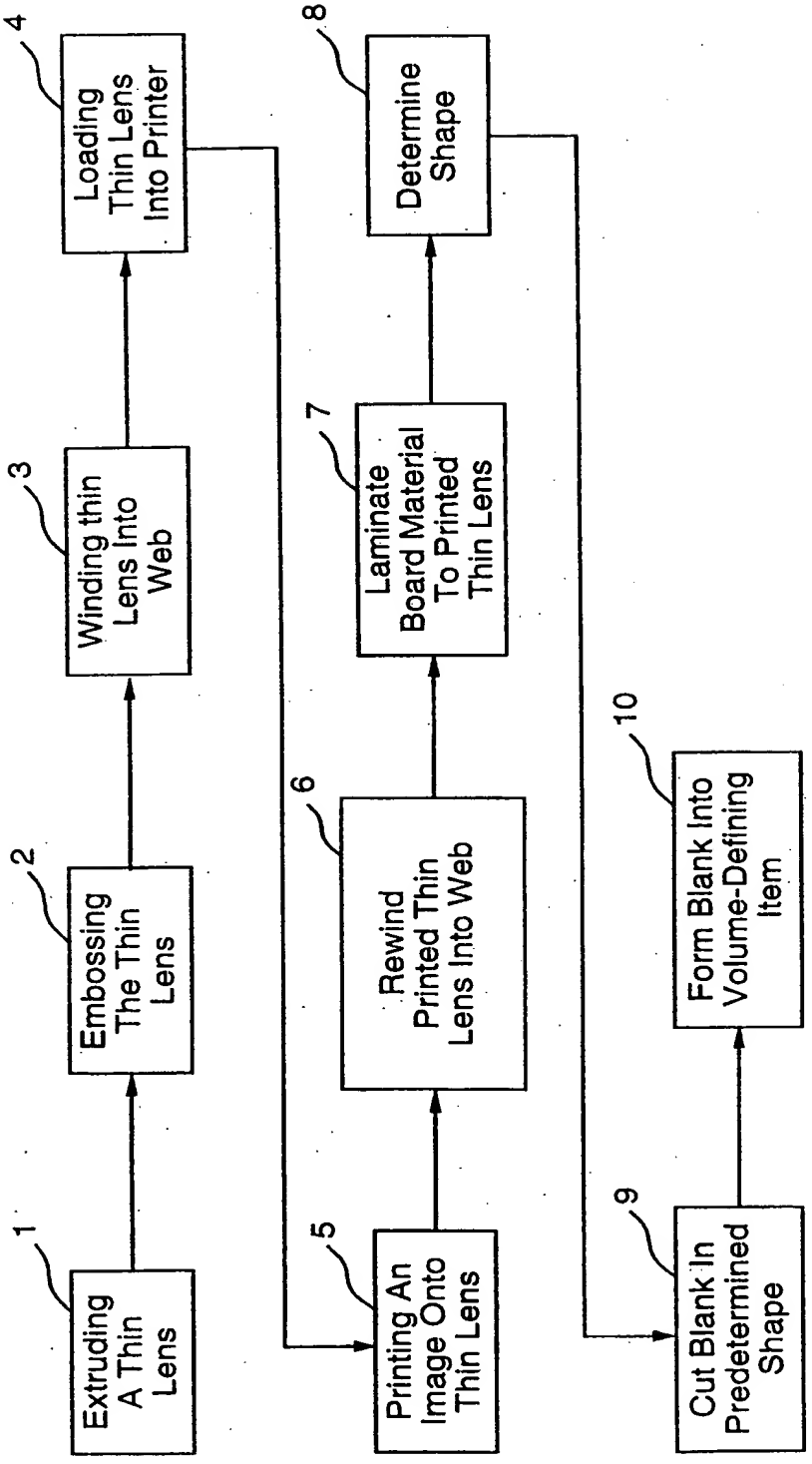

1
Extruding A Thin Lens
2
Embossing The Thin Lens
3
Winding thin Lens Into Web
4
Loading Thin Lens Into Printer
5
Printing An Image Onto Thin Lens
6
Rewind Printed Thin Lens Into Web
7
Laminate Board Material To Printed Thin Lens
8
Determine Shape
9
Cut Blank In Predetermined Shape
10
Form Blank Into Volume-Defining Item

FIG. 1

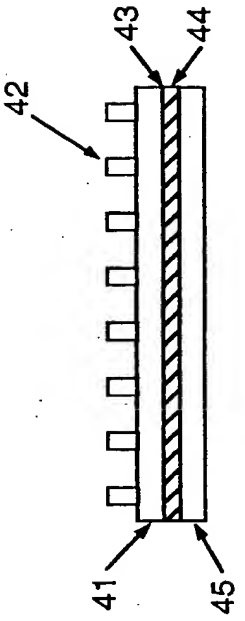


FIG. 4

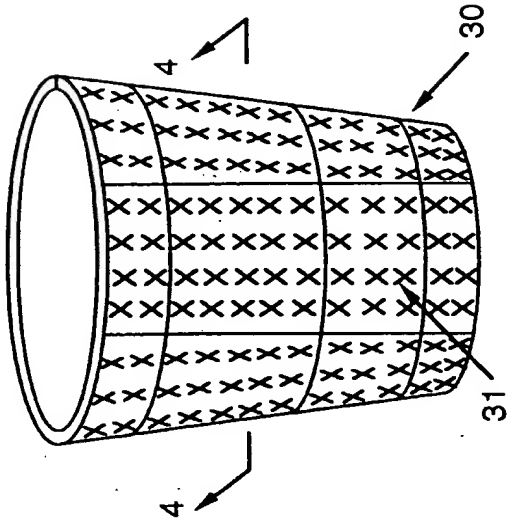


FIG. 3

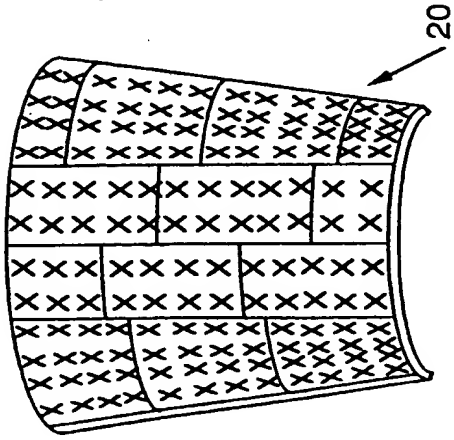


FIG. 2

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US99/18479

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :B31F 1/07; B27N 5/00

US CL :Please See Extra Sheet.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 156/209, 219, 226, 227, 258, 270, 277, 308.4; 428/34.2, 35.7

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

NONE

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

NONE

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 1,855,041 A (BODONY) 19 April 1932, col. 2, line 56, to col. 4, line 24.	1-4, 9-10, 12-14
Y	US 1,984,928 A (HENKEL) 18 December 1934, col. 2, lines 3-55.	1-4, 9-14
Y	US 2,425,043 A (MOORE) 05 August 1947, col. 3, line 64, to col. 7, line 26.	1-4, 9-10, 12-14
Y	US 4,849,040 A (WOOD) 18 July 1989, col. 7, line 25, to col. 13, line 32.	7-8
Y	US 5,560,799 A (JACOBSEN) 01 October 1996, col. 6, line 52, to col. 14, line 21.	1-4, 10
Y	US RE34,829 E (STONE) 17 January 1995, col. 4, line 32, to col. 7, line 27.	5-6

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

*	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E"	earlier document published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
"O"	document referring to an oral disclosure, use, exhibition or other means		
"P"	document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search	Date of mailing of the international search report
28 OCTOBER 1999	17 NOV 1999
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer LINDA L. GRAY Telephone No. (703) 308-0651

Form PCT/ISA/210 (second sheet)(July 1992)*

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US99/18479

A. CLASSIFICATION OF SUBJECT MATTER:
US CL :

156/209, 219, 226, 227, 258, 270, 277, 308.4; 428/34.2, 35.7; 493/55, 58